

Electromagnetic Interactions

- Proposed by James Clerk Maxwell
- Responsible for most interactions in daily life above the nuclear scale (with the exception of gravity)
- Reconciled with Mechanics when Einstein proposed Special Relativity
- Classical EM fixed by Einstein's Photoelectric effect (photons)

EWT (Electro-Weak Theory)

Weak Interactions

- Proposed by Enrico Fermi
- Responsible for radioactive decay and nuclear fusion of subatomic particles
- Caused by emission/absorption of W and Z bosons
- Field strength very small compared to EM (ie weak)

Electroweak Interactions

- A unified theory linking electromagnetic and weak interactions was proposed (independently) by Steven Weinberg, Abdus Salam and Sheldon Glashow
 - Received a Nobel Prize in Physics in 1979
- According to the Grand Unification Theory, the electromagnetic and weak forces merge into one force above 100 GeV (Unification Energy) [see right]
- This means that if the universe was hot enough (10^{15} K, a temperature exceeded until shortly after the Big Bang), the two interactions would merge into one and the one force would be responsible for all interactions

Grand Unification Theory

<http://ircamera.as.arizona.edu/NatSci102/NatSci102/lectures/eraplanck.htm>

